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THE NEW PUBLIC WEATHER SERVICE OF GERMANY.

By DR. P. POLIS, Aachen, Germany.

[Translated from the original by Gustav E. Raueh.]

In the month of July, 1906, there was established, by direction of the Minister of Agriculture, Domains, and Forests, a Public Weather Service. This was first extended to northern Germany, and this year also to southern Germany and Hesse. Northern Germany has been divided into ten districts, in which forecast centers have been established. Proceeding from west to east these centers are located as follows: Aachen, Weilburg on the Lahn, Frankfurt on the Main, Hamburg, Magdeburg, Ilmenau in Thuringia, Berlin, Breslau, Bromberg, and Königsberg; in addition there are Dresden for

the kingdom of Saxony, likewise in southern Germany Strasburg for Alsace-Lorraine, Karlsruhe for Baden, Stuttgart for Württemberg, and Munich for Bavaria, making in all fifteen forecast centers. In the case of the last five mentioned, the weather service centers are combined with the meteorological central offices, whereas in northern Germany, in a good many instances, new centers were established. At Hamburg the center is connected with the Deutsche Seewarte, at Magdeburg with the Wetterwarte of the Magdeburgische Zeitung, at Frankfort with the Physikalische Verein, and at Aachen with the meteorological observatory. In most cases the districts of the weather service stations cover from one to two provinces, viz: Aachen, the Rhine province and Westphalia, as well as the independent Grand-duchy of Luxemburg, where the ducal government has recently established the new service¹. Weilburg and Frankfort on the Main are weather service centers for Hesse and the province Hesse-Nassau; Ilmenau for the Thüringen states; Hamburg for the provinces of Hanover and Schleswig-Holstein; Magdeburg for the province of Saxony; Berlin for Brandenburg and the Grand-duchy of Mecklenburg; Breslau for Silesia; Bromberg for Pomerania and west Prussia, and Königsberg for east Prussia.

In Germany, for some years past, weather forecasts have been distributed by telegraph from the Weilburg weather service for parts of Hesse-Nassau, and since 1904 from the meteorological observatory at Aachen for the central part of the Rhine province; and further, for one year (1901), there existed an experimental service at Berlin for the province of Brandenburg.

Thru the accommodation of the Deutsche Seewarte the forecast centers receive the so-called collected telegram reports from the meteorological stations thruout Europe, in all about seventy stations. These telegrams are received at the forecast centers from 9:30 to 10:15 a. m. Several of the service centers have telegraphic communication, the observatory at Aachen being one; at other places the forecast center is located with the general post-office. Forecast centers receive in addition direct telegraphic reports of observations from stations in their own service districts, also oftentimes from high stations, such as Monte Rigi in Venn, and Feldberg in Taunus. Other data from meteorological and rainfall stations are transmitted by letter. Finally, the service centers receive, either by telegram or by postal card, the gage readings of the height of water in the important rivers of such districts as include the Rhine, the Weser, the Elbe, the Oder, and the Weichsel.

At the forecast centers a weather map is prepared daily; also the so-called working map in manuscript, as well as auxiliary maps showing distribution of temperature, rainfall, and barometric changes thruout Europe. In addition, there are traced general maps of the condition of the weather in the service district itself. All time data are based on 8 a. m., central European time. The telegraphic reports include pressure, temperature, maximum and minimum temperatures, direction and velocity of wind, as well as condition of the weather within the past twenty-four hours. These reports are telegraphed by the use of a cipher code, which is essentially founded upon the relative value of the meteorological elements. Take, for instance, the telegram of May 29, 1906, 8 a. m., "61522 33172 01810". This means that at Berlin the pressure (reduced to sea level and to latitude 45°) was 761.5 mm., west-southwest wind prevailed of velocity 3 (light), the sky was three-fourths obscured (cloudy), the temperature was 17.2° C., there was 1 mm. of precipitation within the past twenty-four hours, and the weather condition was showery the past twenty-four hours.

The working map is completed at about 10:30 a. m. The

¹ In fact the meteorological system was organized in Luxemburg only in 1907 by the writer of this article.

weather map contains a review of the weather conditions, particular consideration being given to meteorological conditions in the service district in which the station is located. Beneath the map appears the weather forecast, also directions for the use of the weather map, and the telegraphic reports of local observations at the stations in the service district. According to the meteorological conditions, separate forecasts are made at the forecast centers for different parts of their districts. The service districts have for this purpose been divided into subdistricts, according to the topographical and climatic conditions of the country. Forecasts are made and distributed only at forecast centers. Owing to the diversified condition of the country and its climate the Aachen service has the greatest number of subdistricts, viz, twelve. It may be worth mentioning, as an example of the climatic contrasts, that, within a distance of 50 kilometers, the difference in the normal precipitation may range upward of 700 millimeters; for instance, the normal precipitation per annum at Monte Rigi, in Venn, is 1305 mm., while at Euskirchen it is only 546 mm.

At 11 o'clock the forecast is delivered by the service station to the telegraph office, whence it is disseminated by telegraph. Every post-office, even the smallest in the rural districts, receives the weather telegram, and the text of the forecast is posted on the outside of the building for the benefit of the public. This is completed by 12 o'clock, noon. The forecasts have by this time been posted at more than twenty thousand public places in northern Germany. Forecasts are made for the following thirty-six hours. Information as to the probable condition of the weather for the day can also be furnished.

The transmission of the weather forecasts by telegraph is by the use of a word code, which consisted last year of two key words and this year of three key words. For an illustration take the following:

Forecast: To-morrow rain followed by dry weather and generally clear.

Number: 03 01

Telegram: Ebene

windy; colder. Probably an early change in weather.
04 23 04

Lama Polster

In addition, at the forecast centers copies of the weather map are being prepared. This is accomplished by a printing process with the use of a Roneo or cyclostyle apparatus. The process differs from that in use in America in that the whole text, statistics, and even the weather map itself, are written and drawn upon a wax map. The apparatus contains a roller, which has to be saturated with ink, the motive power for the apparatus being, as a rule, derived from an electric motor; it delivers something like forty finished weather maps a minute. As a rule the printing of the weather map commences at 10:45 a. m., when the maps are immediately wrapt and mailed, so they can be displayed the same day. At 12 o'clock this work is finished.

Attached to the service station at Aachen is a substation, which is located at Bonn on the Rhine, where weather maps are issued, no forecast being prepared at this place. The substation at Bonn is in telephonic communication with the Aachen observatory every morning and receives the forecasts by telephone.

The issue of the weather map in Germany is a large one; for instance, at the Aachen station 1500 are issued daily. The distribution is effected exclusively by mail, the cost of each, including delivery, being 50 pfennigs a month. In all

about 12,000 weather maps are issued daily at the various service stations thruout Germany.

During the winter season (October to April, inclusive) weather forecasts are not given the same wide distribution as in summer; they are only published in the newspapers and on the weather maps.

For the purpose of verifying forecasts, suitable persons (observers at meteorological stations, directors of schools, etc.) are appointed in every service district to keep a record of the occurrences of weather conditions and to remark upon the verification of the forecasts. Their reports are sent in weekly. The Aachen service station has cooperating observers at approximately 115 places. The final verifications are made at the different forecast centers.

For educational purposes directors of the service and their assistants give lectures on meteorology for the benefit of agricultural and other societies.

It is a difficult matter to make a weather forecast in Europe,

especially so in Germany, as the movements of the areas of low and high pressure are quite complicated. The constant formation of separate low pressure areas and the variety of climatic conditions add to the difficulty of making precise weather predictions. In addition low pressure areas appear suddenly on the British coast, influencing with extraordinary rapidity the weather conditions in western and central Europe. The conditions for the weather service of the United States are much more favorable, for, on account of the absence of a mountain range running from west to east, areas of uniform weather are large, and besides the paths of the areas of low and high pressure are considerably more regular. Since all lows and highs come from the west and can be recognized at a distance of thousands of kilometers, and in passing from the Pacific to the Atlantic occupy several days, therefore it is possible to make forecasts for a longer period than in Europe, namely, forty-eight hours.

THE WEATHER OF THE MONTH.

By Mr. P. C. DAY, Assistant Chief, Division of Meteorological Records.

PRESSURE.

The distribution of mean atmospheric pressure for August, 1907, over the United States and Canada, is graphically shown on Chart VI, and the average values and departures from the normal are shown for each station in Tables I and V.

Under normal conditions the atmospheric pressure increases during August from that of July over the entire northern half of the United States, and apparently the whole of Canada, from the Rocky Mountains eastward to the Atlantic, with the maximum increase, more than .05 inch, over the lower St. Lawrence Valley.

Over the South Atlantic and Gulf States August marks the advent of the West Indian hurricane season, and the occasional passage of these storms westward and northeastward over the districts mentioned tends to lower the average pressure from that of July, the decrease over the Florida Peninsula, Cuba, and adjacent regions amounting to as much as .05 inch. On the north Pacific coast the beginning of the rainy season is indicated by diminishing pressure from that of July, with the maximum decrease, about .05 inch, along the immediate coasts of Washington and Oregon.

During August, 1907, the average pressure increased over that of July in all portions of the United States and Canada, except the upper Missouri Valley and adjoining Canadian districts and a small area embracing the coast district of northern California. Over the eastern districts of the United States and Canada the increase was quite marked, ranging from .10 to .15 inch, while over the coast districts of Washington the increase was from .05 to .08 inch.

Along the northern portions of Montana and North Dakota and the adjoining Canadian Provinces of Alberta and Saskatchewan, the pressure decreased from that of July by amounts from .05 to .07 inch.

Pressure was decidedly above normal over the north Pacific coast, the lower Mississippi Valley, and the Gulf and south Atlantic coasts. Over the northern portion of the United States and the Canadian Provinces east of the Rocky Mountains, except the peninsula of Ontario, the pressure averaged from .03 to .07 inch below normal.

Pressure averaged 30.05 inches, or above, over the Florida Peninsula, the central portion of the Appalachian region, and along the coasts of Washington and Oregon; and 29.85, or lower, over the Canadian Northwest Provinces, southeastern California, and the southern portions of Arizona and New Mexico.

The high pressure extending from the west Gulf coast northeastward over the South Atlantic States, with more than the usual decrease in pressure northward, augmented some-

what the force and persistency of the southerly winds normal to the season in the districts east of the Rocky Mountains. Over the northern half of the above district, as far eastward as the Great Lakes, the wind movement ranged from 10 to 30 per cent above the seasonal average. Southerly surface winds prevailed over nearly all districts east of the Rocky Mountains, while over the Plateau and Pacific coast districts the winds were generally from some westerly point.

TEMPERATURE.

The month was colder than the average over the entire northern half of the United States and the whole of Canada as far as observations extend, except a small area near the Gulf of St. Lawrence, where a small excess of temperature was noted. Over the central and northern portions of the Rocky Mountain and Plateau districts, the monthly averages were nearly 5° below the normal, making the fifth consecutive month during which the mean temperature has been continuously below the average in those districts. Over the Lake region, Middle Atlantic States, and New England the temperature averaged from 2° to more than 4° below the normal, and was likewise the fifth consecutive month with mean temperature below the seasonal average.

Temperatures above the average were recorded over the whole of the cotton-growing States, with the maximum excess over western Texas, where the average for the month exceeded the normal by nearly 5°.

Abnormally warm weather occurred over most of Texas, Arkansas, southwestern Missouri, Kansas, and Oklahoma during the second week of the month. From the 10th to the 12th the maximum temperatures over Arkansas, and the adjoining districts of Missouri, Kansas, Oklahoma, Texas, Louisiana, and Mississippi, ranged from 100° to 110°, and were in many cases, especially over Arkansas, the highest ever recorded. High temperatures again prevailed in the above districts near the end of the month. Maximum temperatures slightly above 100° were recorded in the valley of the Columbia River and over the plains of eastern Washington and Oregon and the lower elevations of Idaho on the first day of the month. Over central and southeastern California and the southern portion of Arizona maximum temperatures from 100° to 110° and over were recorded, but these readings were not unusual for the region and season.

Minimum temperatures of 32° or lower occurred in the mountain districts from northern Arizona and New Mexico northward, and over the northern portion of the States along the boundary from the Rocky Mountains to New England, accompanied by light to heavy frosts, but without serious injury to vegetation.